

# STAT F401: Regression and Analysis of Variance, Fall 2010

Lectures: MWF 11:45–12:45 Chapman 106

Labs: M 2:15–5:15 (F02), Tu 9:40–12:40 (F01) Bunnell 407

Final exam: 10:15–12:15, Wed Dec. 15 Bunnell 407

## **Instructor: Zepu Zhang.**

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Office Hours: MWF 2:30–3:30, or by appointment.

## **Teaching Assistant: Jason Waite.**

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Office hours: Tu 1:30–4:30, or by appointment.

## **Textbook:**

Required:

- *Applied Linear Statistical Models*, 5th edition, by Michael Kutner, Christopher Nachtsheim, John Neter, and William Li. McGraw-Hill/Irwin, 2005.
- *An Introduction to R*, available at <http://www.r-project.org>.

**Blackboard:** Use the Blackboard site for this course to access schedule, announcements, lecture notes, homework assignments and solutions, grades, and other related materials. Some documents may see small modifications/updates after first posting.

**Prerequisites:** Stat 200, Stat 300 or an equivalent course is necessary preparation; a grade of B or better in the previous course is recommended. If you have not had a statistics course, or if it has been a long time since you've had a statistics course or used statistics, you are strongly advised to take Stat 200 or Stat 300 before taking Stat 401. Appendix A in the KNNL text may be useful for reviewing.

## **Goals and expected learning outcomes:**

- Learn simple and multiple regression, including multiple and partial correlation, the extra sum of squares principle, indicator variables, and model selection techniques.
- Learn how to conduct one-way analysis of variance for completely randomized designs.
- Learn how to use graphics and specific tests to determine if the modeling assumptions are met.
- Learn to use R for general computation, graphics, and simple programming in the context of fitting and assessing linear models.

## **Computation and software:**

We will use the free software R. Every student should download it from <http://www.r-project.org> and install it on their own computer. If R is whole new software to you, the available classroom time will NOT

be enough to get you really comfortable with it. Expect to spend time learning and exploring R on your own. However, the instructor and TA will be able to help you in learning R.

Although the course treats R more as a tool than as a topic in itself, no previous experience with R is assumed. Previous experience in computer programming will be very helpful.

**Note on learning R:** all R handouts (such as lab handouts) are supposed to be *tried*, not just *read*.

## Lab and homework:

The computer labs are designed for you to

- (1) learn to use R;
- (2) learn to use R to conduct computations pertaining to the lectures' content;
- (3) do homework problems and get help from the TA.

The labs are required regardless of whether a particular lab session assigns a write-up to submit.

Each homework assignment consists of questions, problems, and possibly write-up from the most recent lab session. Exact content of the lab write-up, if any, will be announced.

Homework should be typeset/word-processed (preferred) or hand-written neatly. Turn in hard copies only. Remember to number the pages and use a stapler. Homework should be submitted to the instructor or the TA in class or in mailbox.

Show middle steps, formulas, main R code and output, for each homework problem.

Special note about computer output in homework submission:

- (1) Never print the computer output directly; instead, include it in your write-up and perform necessary editing, omission, decoration as explained below.
- (2) Only include sections of the output that show significant steps, final results, etc. Never list whole datasets; instead, keep the first few and last few numbers and use “...” to signal omission.
- (3) Do not let one graph consume a whole page unless the amount of information in the graph justifies this size. Usually the graph should be resized and integrated into the document.
- (4) Use circles and arrows to mark out important numbers in the computer output.

**Lecture notes:** Lecture notes serve as outlines and pointers. They are not meant to be a polished reader. Unless otherwise announced, the notes mention all required topics, and textbook topics not mentioned in the notes are less important. It may happen that certain content of the notes do not get enough discussion time in the lectures; that content is still required material.

Lab handouts should be treated similarly.

**Policy on late homework:** Late homework will result in the loss of 20% of the points each additional (business) day that it is late (weekend counts as one business day); thus homework that is more than one full week late will receive no credit. Exceptions are made on a case-by-case basis by the instructor and typically are made only for documented health or university-sponsored activities.

## Grading policy:

There will be two in-class hour-long midterm exams and one two-hour final exam. Coverage of each exam will be announced later; the final exam will in principal cover the entire course.

The exams will be closed-book. You may use notes *prepared by yourself* on two sheets of  $8\frac{1}{2} \times 11$  inch paper (both sides). You may not use a computer in the exams. You may use a calculator. (It must be a calculator only; it must not be a device that can store notes.)

In all homework and exams, messy presentation and incomplete/unclear writing, as determined by the grader, may cost partial credit.

In all homework and exams, intermediate steps that show your understanding of the topic and procedure are as important as the final answer. Both the procedure and the final answer carry credit.

Your final grade will be calculated based on the following proportions:

|                      |                         |
|----------------------|-------------------------|
| Homework (incl labs) | 40%                     |
| Midterms             | 30% ( $15\% \times 2$ ) |
| Final                | 30%                     |

Grading scale: A (honor grade): 90–100; B (outstanding): 80–89.99; C (average): 70–79.99; D (below average): 60–69.99; F (failure): 0–59.99.

**Ethics:** Studying together, and getting study assistance from a tutor, is allowed and encouraged. Copying someone else's work and representing it as your own is plagiarism. Plagiarism and other forms of cheating in homework and exams may result in a 0 (zero) score for the homework/exam involved.

Please read "Student Code of Conduct" on pages 117–118 of the *Class Schedule*, and policies of the Department of Math and Stats at [www.dms.uaf.edu/dms/Policies.html](http://www.dms.uaf.edu/dms/Policies.html).

**Disability Services:** If you have a physical handicap or learning disability, please make me and the Office of Disabilities Services (474-7043) aware of the situation so that reasonable accommodations can be made.

**Withdrawal:** I may withdraw any student from class who (1) misses an exam without a valid reason OR (2) misses three homework assignments.